

Robotics Nanodegree

Deep Learning Project

In this project, we'll use the deep neural network to identify and track a target in simulation. So-called "follow me" applications like this are key to many fields of robotics and the very same techniques you apply here could be extended to scenarios like advanced cruise control in autonomous vehicles or human-robot collaboration in industry.

If you need further information, assistance or referral about a project issue, please contact kiang.ng@hotmail.com.





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Project 4: Follow Me

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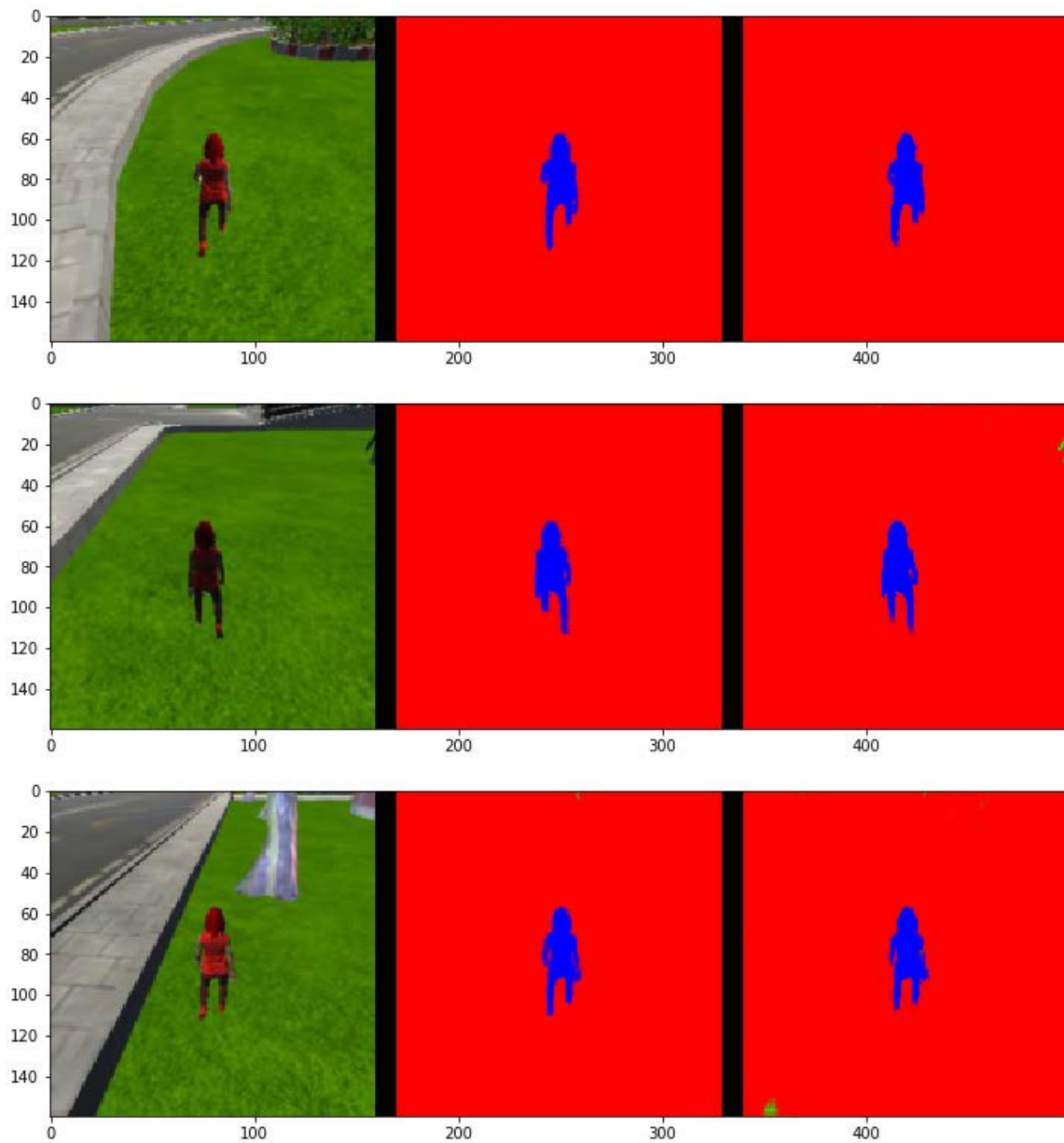
Deep Learning Project

In this project, we will train a deep neural network to identify and track a target in simulation. So-called “follow me” applications like this are key to many fields of robotics and the very same techniques you apply here could be extended to scenarios like advanced cruise control in autonomous vehicles or human-robot collaboration in industry.



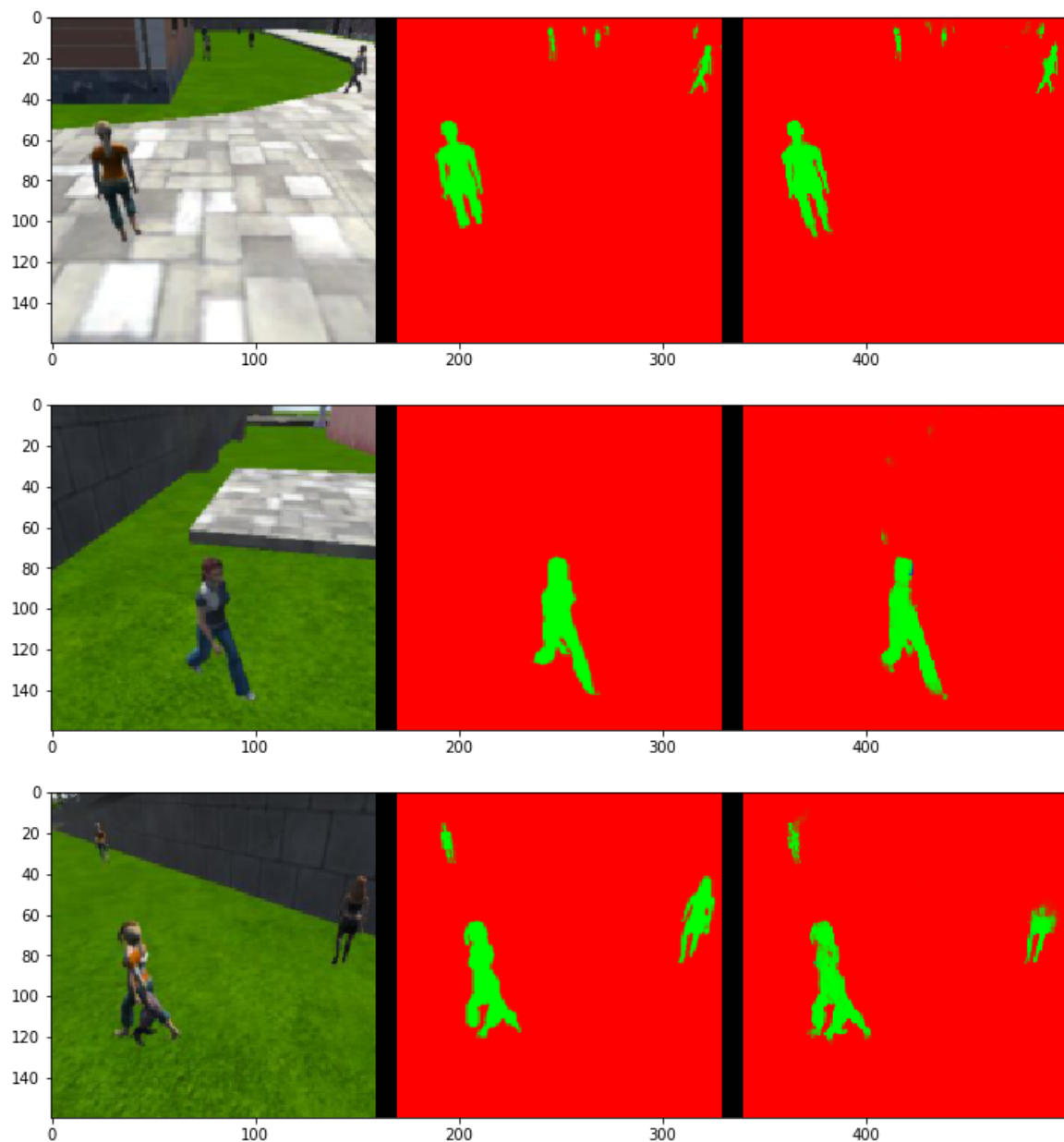
Images while following the target

This works pretty good while there's a tiny errors exists on the third image.



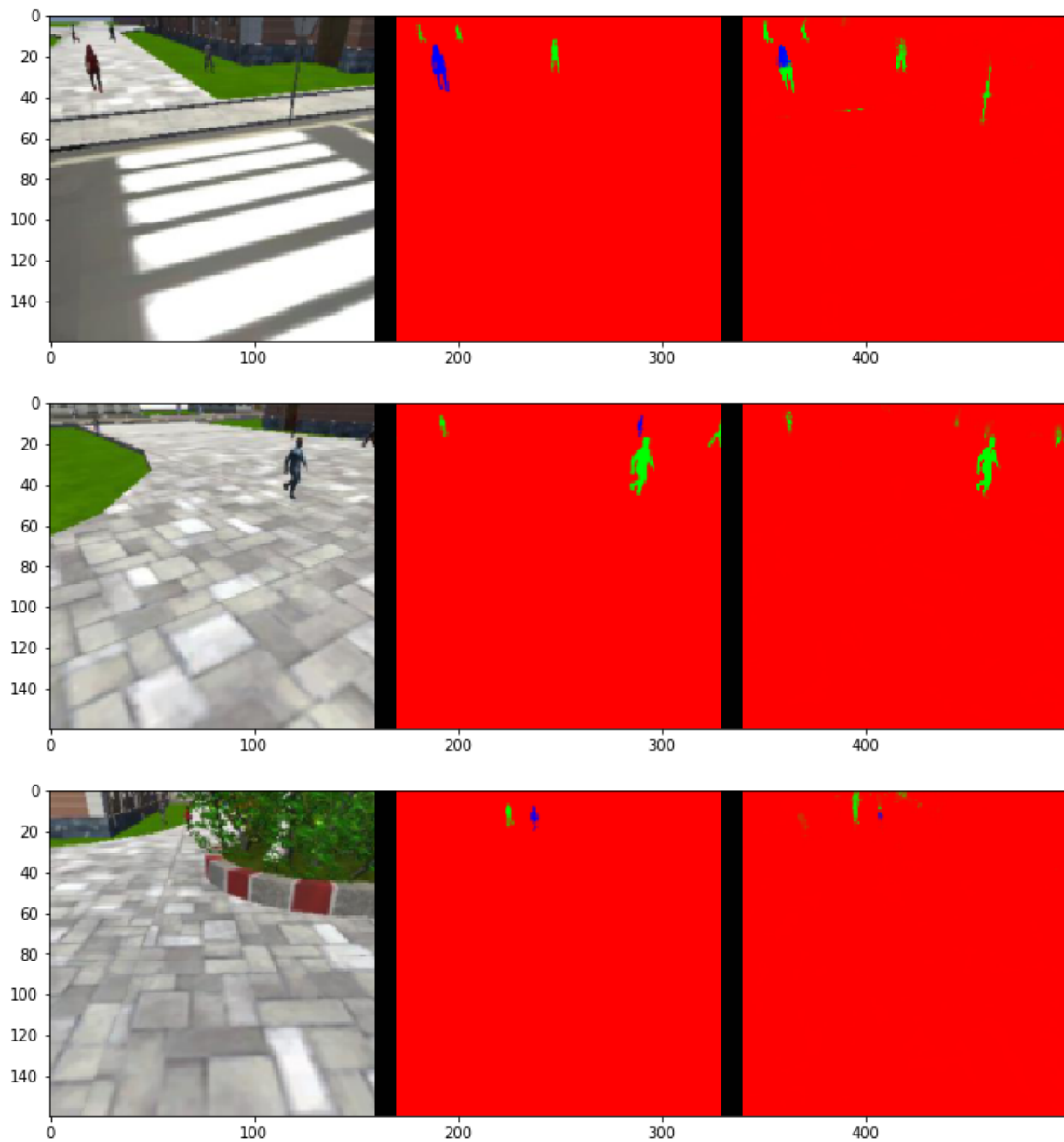
Images while at Patrol without target

As you can see from the image below, this works pretty well!



Images while at patrol with target

This is challenging when detecting the target at very far away from the quadrotor vision. I feel surprise it works to detect the target.



Hyperparameters

Learning rate : 0.002

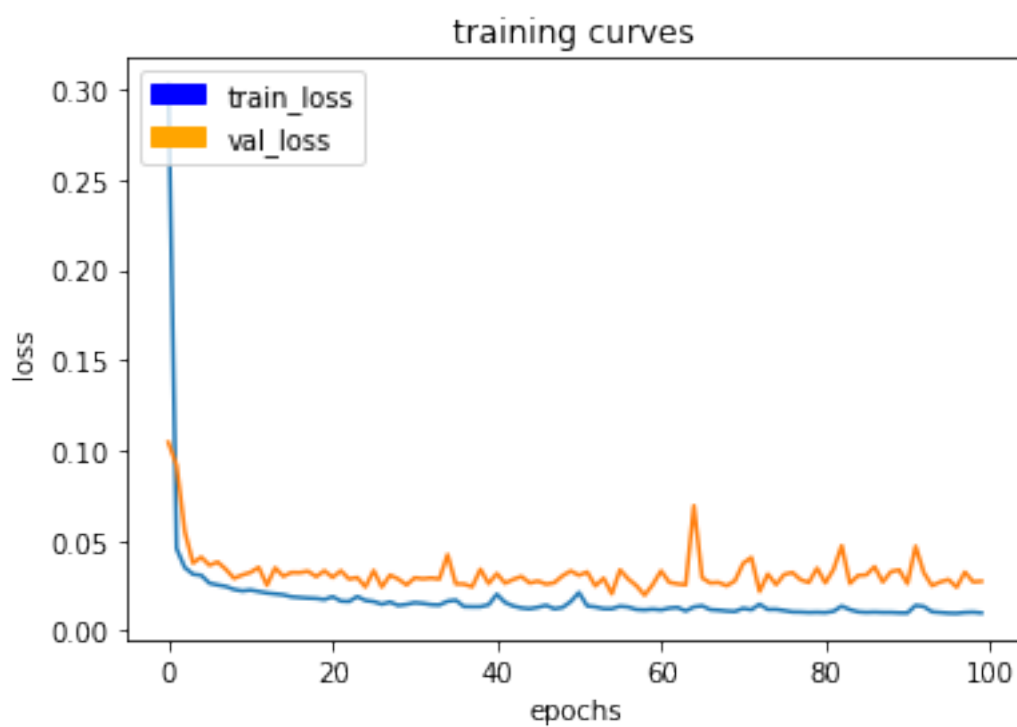
Batch size: 32

Numbers of Epoch : 100

Steps per Epoch : 200

Validation Steps : 50

Workers : 0.41



Result

```
# Scores for while the quad is following behind the target.  
true_pos1, false_pos1, false_neg1, iou1 = scoring_utils.score_run_iou(val_following, pred_following)
```

```
number of validation samples intersection over the union evaluated on 542  
average intersection over union for background is 0.995990646239  
average intersection over union for other people is 0.36794329476  
average intersection over union for the hero is 0.916386351051  
number true positives: 539, number false positives: 0, number false negatives: 0
```

```
# Scores for images while the quad is on patrol and the target is not visible  
true_pos2, false_pos2, false_neg2, iou2 = scoring_utils.score_run_iou(val_no_targ, pred_no_targ)
```

```
number of validation samples intersection over the union evaluated on 270  
average intersection over union for background is 0.986185149222  
average intersection over union for other people is 0.718848343485  
average intersection over union for the hero is 0.0  
number true positives: 0, number false positives: 63, number false negatives: 0
```

```
# This score measures how well the neural network can detect the target from far away  
true_pos3, false_pos3, false_neg3, iou3 = scoring_utils.score_run_iou(val_with_targ, pred_with_targ)
```

```
number of validation samples intersection over the union evaluated on 322  
average intersection over union for background is 0.996499004335  
average intersection over union for other people is 0.453317615995  
average intersection over union for the hero is 0.215140560149  
number true positives: 124, number false positives: 2, number false negatives: 177
```

Final Score : 0.41